

Infant Preparations for Language: Social Communication

What are words?

Arbitrary association between sound & referent

"frog"



Yes, but ... used in the service of communication

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Infant Preparations for Language: Social Communication

- Words refer – they are 'about' aspects of the world, or ideas
- Speakers choose words to achieve communicative goals

And this means:

- Language use is **inherently social**
 - We use language as a tool to establish shared attention, knowledge, or goals

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How do children understand the social nature of reference? (Or *when* do they?)

- Do toddlers learn words entirely by 'dumb' association?



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How do children understand the social nature of reference?

- Do toddlers learn words entirely by 'dumb' association?
- Or do they use social-communicative cues to determine
 - What is this person talking about?
- What cues might be available?
 - Understanding of actor's goals
 - Eye gaze
 - Pointing

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Outline

1. Infant participation in social interaction
2. Infant understanding of actors' goals
3. Infant comprehension of the referential nature of gaze and pointing ... and words
4. Infant use of social knowledge in communication

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Infants are predisposed toward social interaction

Newborns' auditory & visual preferences:

- speech (>> other complex sounds)
- mother's voice
- native language
- faces or face-like stimuli
- faces with eyes open
- faces with direct gaze (>> averted gaze)



3-month-olds smile more during eye contact than when interacting adult looks away

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Infants pick up on social turn-taking [video]



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Language experience affects social preferences

Kinzler, Dupoux, & Spelke

- 6-month-olds looked longer at a person who previously spoke *their native language*



speaks infant's native language



speaks another language



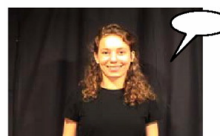
now measure visual preference

8

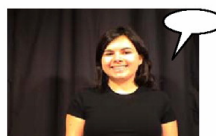
Language experience affects social preferences

- 10-month-olds accepted a toy from a person who previously spoke *their native language*

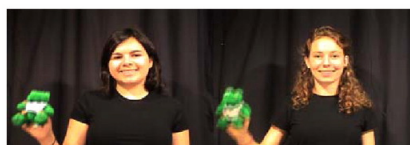
speaks
French



speaks
English



Infants learn from experience with social interactions – and prefer partners who follow the familiar conventions



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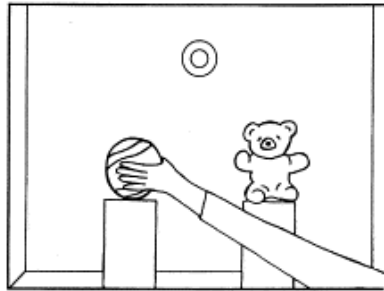
Outline

1. Infant participation in social interaction
 - infants find contingent social interaction rewarding
 - learn a lot about social-linguistic interaction
2. Infant understanding of actors' goals
3. Infant comprehension of the referential nature of gaze and pointing ... and words
4. Infant use of social knowledge in communication

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Do infants interpret action as goal-directed?

Recall this deceptively simple task:



What matters about this action?

The path the hand takes? Or the object it grasps?

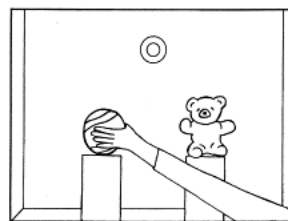
This depends on understanding the actor's goal.

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Do infants see action as goal-directed?

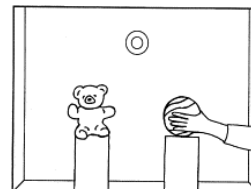
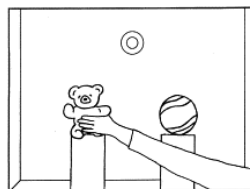
Familiarization event

Woodward
9- and 5-month-olds



New-goal Event

Old-goal Event



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More complex version at 11 months



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How to interpret these findings?

- *Mentalistic interpretations:*
 - Infants interpret agents' actions as goal-directed
 - They infer the underlying goal of actions they observe
 - ... so even early word-learners might be able to diagnose our goals to help interpret our words
- *Non-mentalistic interpretations*
 - Learned about sequences of familiar actions

Infants' responses to familiar actions like grasping, pointing, or looking, performed by familiar agents (humans), are open to both kinds of interpretations

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How to decide between mentalistic & non-mentalistic interpretations?

- Expand the range of situations in which we assess infants' understanding of agents' goals
 - to include unfamiliar actions
 - and unfamiliar agents

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Can infants identify an unrealized goal?

Meltzoff

Imitation task (e.g., pulling apart a dumbbell toy)

18, 14 months

3 conditions:

Successful-action condition

Unsuccessful-action condition

Control condition (no demo)

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Unsuccessful-action condition:



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Results:

Do the children imitate the successful action?

Successful-action condition: YES

Unsuccessful-action condition: YES

Control condition (no demo): NO

Infants can **detect the (hidden) goal** of the actor, even when unsuccessful.

- similar results in violation-of-expectation (VOE) tasks with younger, 8-month-old infants

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How do these results bear on the choice between mentalistic & non-mentalistic interpretations?

- Could understanding of unrealized goals support a mentalistic interpretation of imitation & goal perception?
- or still be consistent with a non-mentalistic interpretation? (how?)

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Infants interpret why *means of action* was chosen, given situational constraints

Gergely and Csibra

Imitation task (e.g., turning a light on with forehead)

14 months

2 conditions:

Hands free condition

Hands occupied condition

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Hands free



Hands occupied

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Results:

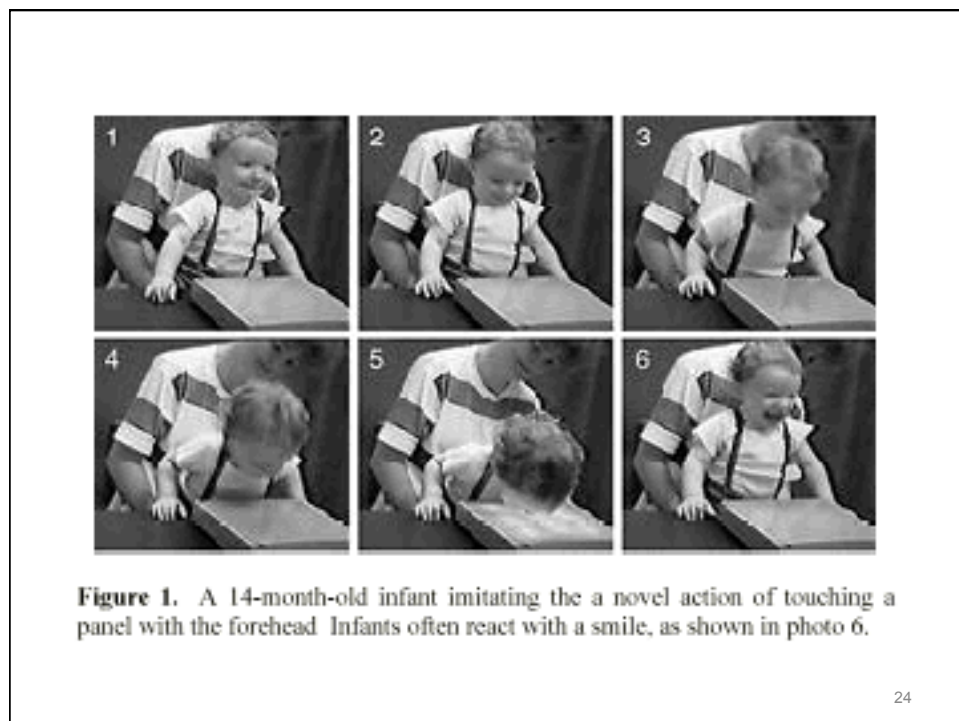
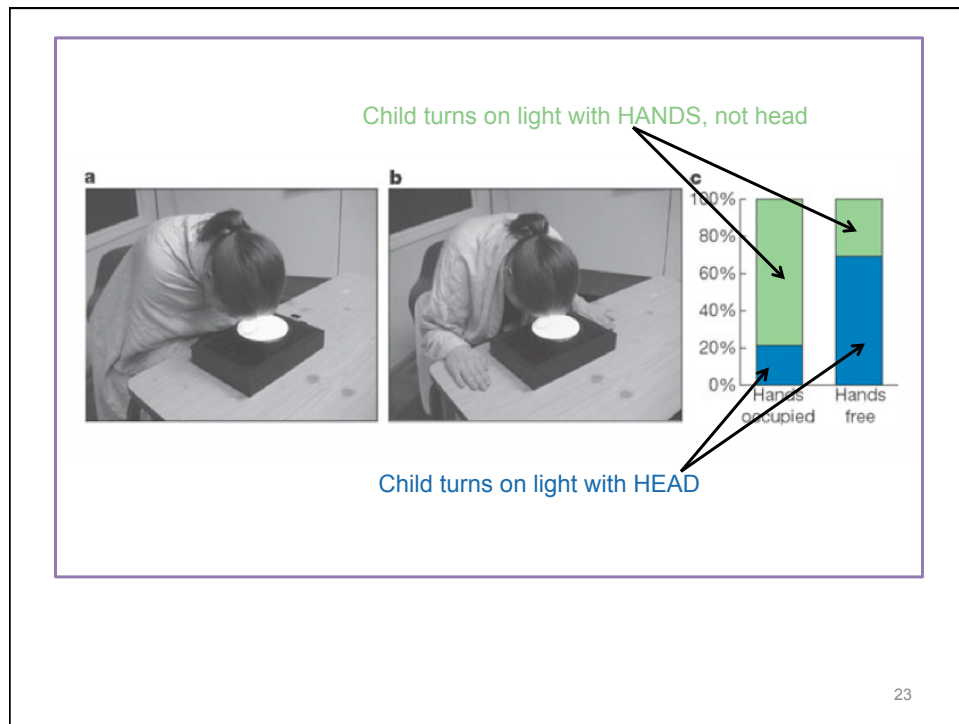
Do the children turn on the light with their heads?

Hands free condition: YES

Hands occupied condition: NO

Expect others to be "rational"; there must be a reason why actor uses forehead when hands are free!

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Similar results with younger infants?

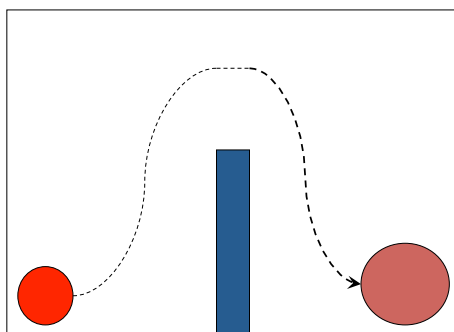
Gergely and Csibra

Violation-of-Expectation (VOE) task

12 and 9 months

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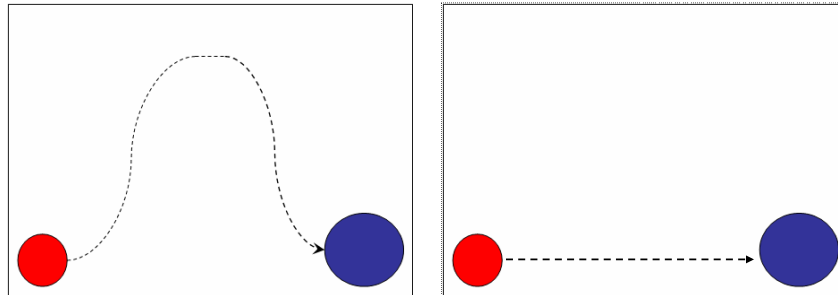
Familiarization Trials



Small agent jumps over obstacle to reach large agent

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Test events: Obstacle removed



Same-path event

New-path event

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Results:

Look reliably longer at **same-path** than new-path event

Detect the goal of the small agent:
to reach the large agent

Expect the small agent to be "rational":
when obstacle is removed, more efficient to go straight

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How does this result bear on the choice between
mentalistic & non-mentalistic interpretations?

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What counts as an 'actor'?

Does the actor need to be human? NO

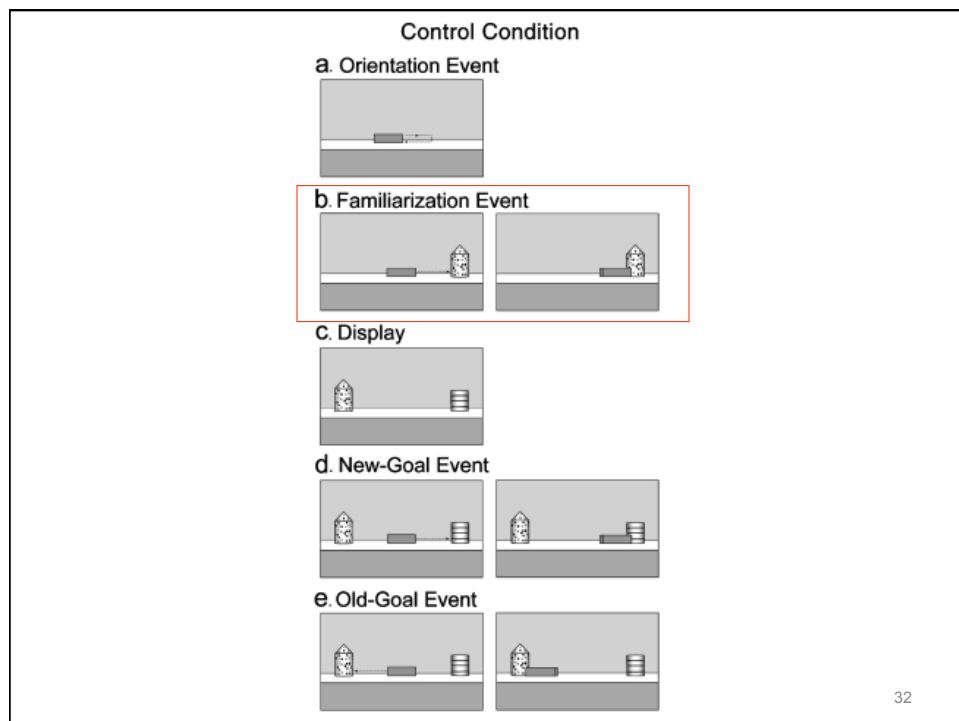
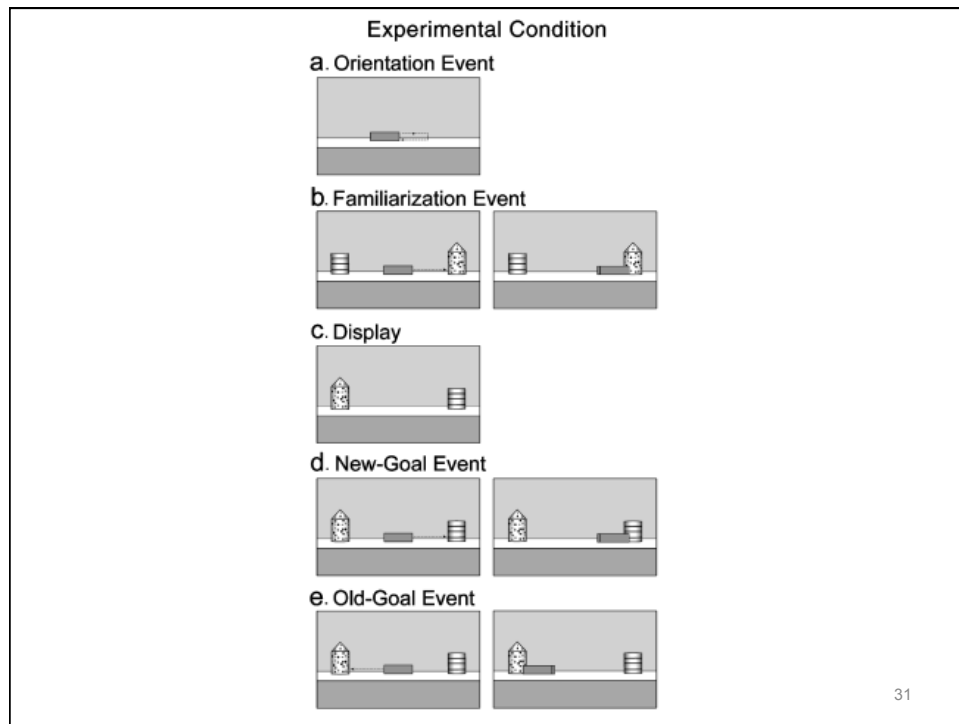
Luo & Baillargeon

5-month-olds

self-moving box repeatedly 'chooses' one object

Experimental and control conditions

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Results:

Experimental condition:

- Look longer at **new-goal** than at old-goal event
- Attribute to the self-moving box a **preference** for one of 2 objects
- Expect the box to maintain this preference when objects' locations are reversed

Control condition:

- Look equally at both events
- Uncertain what the box will do when new object is introduced: may prefer old or new object

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Do infants know goals/preferences are individual,
rather than shared across all people?

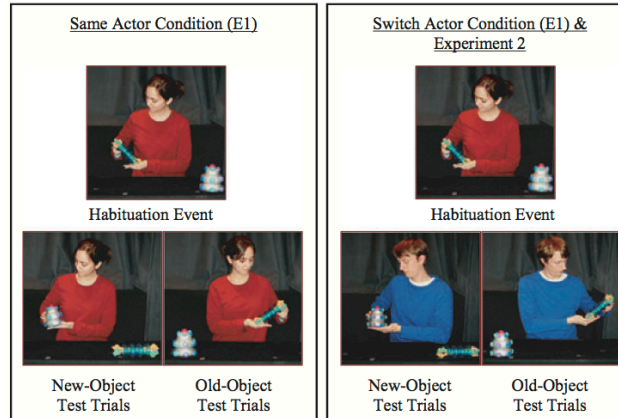
- Remember Repacholi & Gopnik (1997)?



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Do infants know goals/preferences are individual, rather than shared across all people?

- Even 9-month-olds assume the toy preferences of one person don't predict the toy preferences of another (Buresh & Woodward, 2007; Henderson & Woodward, 2010)



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Outline

1. Infant participation in social interaction
2. Infant understanding of actors' goals
 - Interpret action as goal-directed by 5 months
 - Use action to determine actors' goals, preferences
 - Restrict preferences to individual by 9 months
 - Expect means of action to make sense, given the goal and situational constraints
 - Infer goal of incomplete action by 8 months
 - 'Actor' = something that moves on its own, perceives its environment, & chooses a path of action

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When do infants understand gaze as a referential cue ... as 'about' the object you're looking at?

- Spontaneous gaze-following emerges in 2nd half of first year
- Recall that even 3-month-olds follow an adult's head-turn under ideal circumstances

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Do infants infer hidden objects from eye gaze?
Moll & Tomasello, 12- and 18-month-olds



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Again, this gaze-following result is open to both
mentalistic & non-mentalistic interpretations

- Infants follow adults' gaze to a hidden object because they:
 - A: Infer that the adult must have seen something there that the baby can't see.
 - B: Have learned that if they follow the direction of an adult's head turn they find interesting sights.

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What counts as an actor whose 'gaze' can be followed?

Does it have to be human? NO!

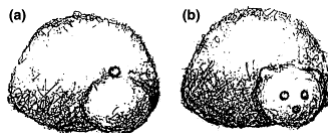
Johnson et al., 12-month-old infants

2 key manipulations:

- Does the object have a face?
- Does the object respond contingently to baby?

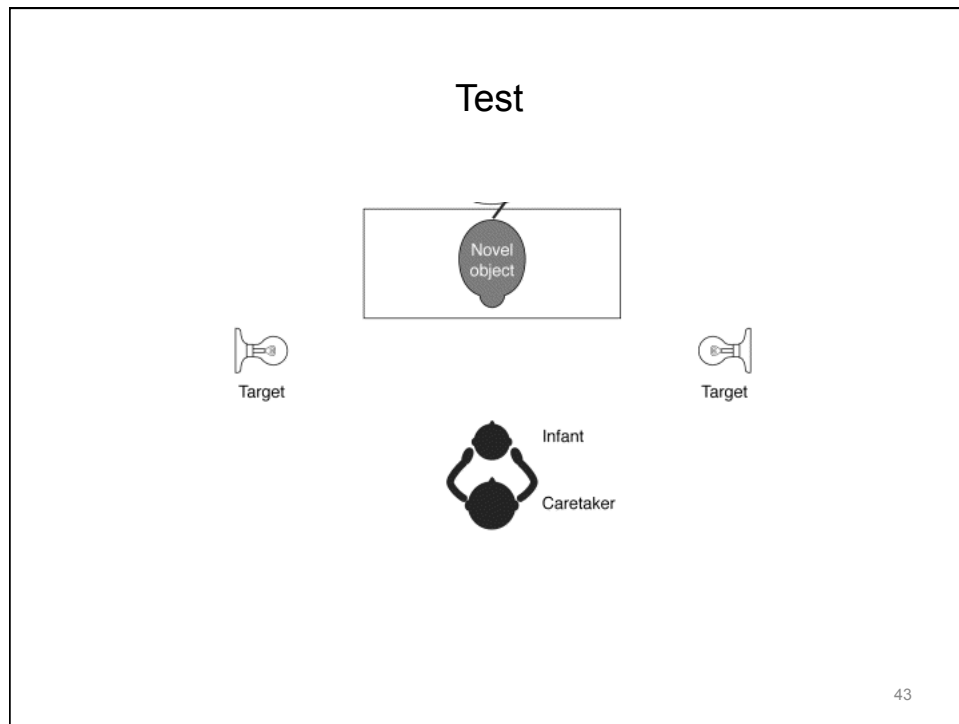
41

Familiarization



	No Face (a)	Face (b)
Contingent Beeping		
Non-Contingent Beeping		

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Results

- 12-month-olds turned in direction of object's 'gaze' more often than the other way IF the object had a face OR responded contingently

	No Face	Face
Contingent Beeping	YES	YES
Non-Contingent Beeping	no	YES

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When do infants understand pointing is 'about' the object pointed at?

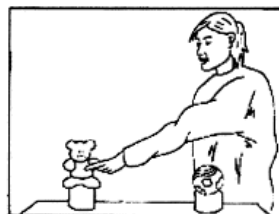
- Infants begin to point ~ 11-12 months
- Woodward
 - Do infants perceive pointing as goal-directed?
 - 9- and 12-month-olds

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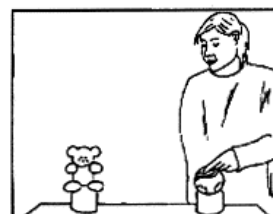
When do infants understand pointing is 'about' the object pointed at?



Habituation Event



New Side Test Event



New Referent Test Event

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Results

12-month-olds

- Look longer at **new-goal** than at old-goal event
- Interpret pointing as goal-directed ('about' the object)
- Attribute to actor a preference for one of 2 toys
- Expect the actor to maintain this preference when toys' locations are reversed

9-month-olds

- Look equally at new- and old-goal events
- Fail to interpret pointing as goal-directed ('about' the object)

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When do infants understand that words communicate information?

We don't need to understand the words to know that something is being communicated



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When do infants understand that words communicate information?

Vouloumanos et al. (2012)
12-month-old infants

Familiarization



Failed Action

Pretest



Neutral Interaction

Test



Test - Speech or Cough

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When do infants understand that words communicate information?

Vouloumanos et al. (2012)
12-month-old infants

Familiarization



Failed Action

Pretest



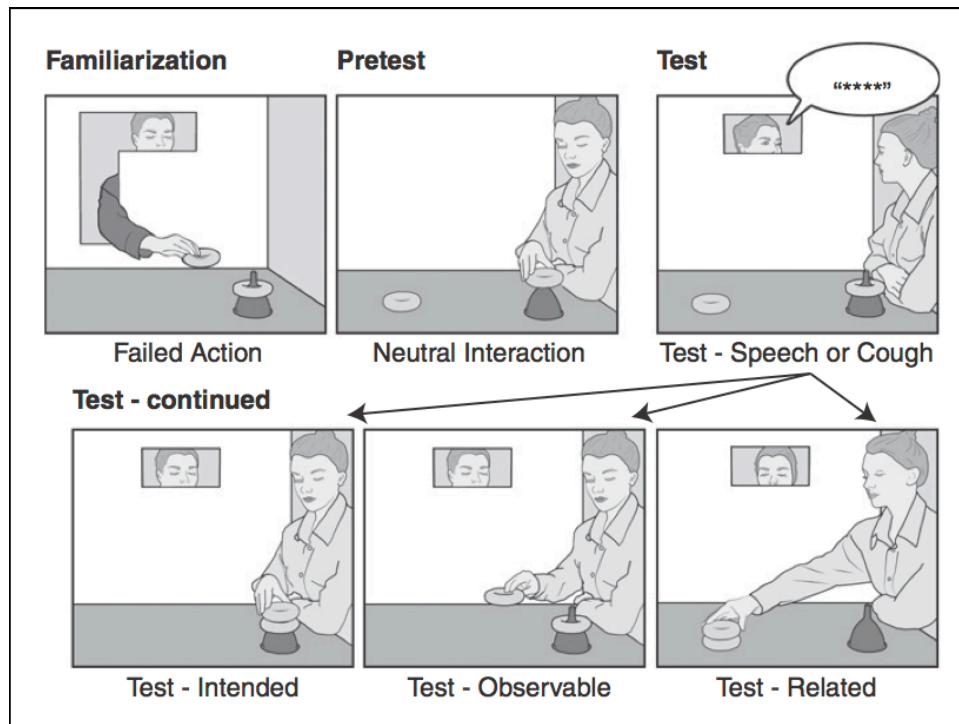
Neutral Interaction

Test



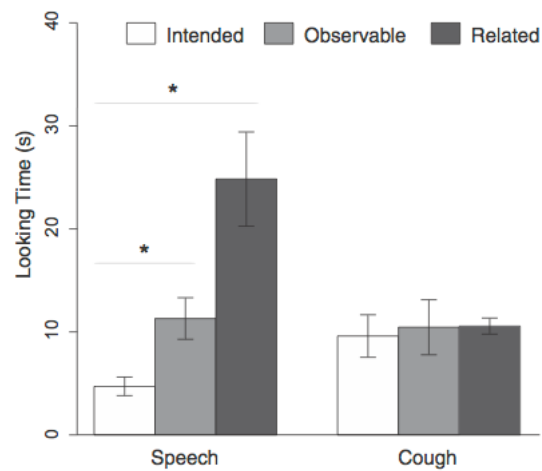
Test - Speech or Cough

50



When do infants understand that words communicate information?

Vouloumanos et al. (2012); 12-month-old infants



Outline

1. Infant participation in social interaction
2. Infant understanding of actors' goals
3. Infant comprehension of the referential nature of gaze and pointing
 - By 12 months, infants treat gaze & pointing as 'about' the object at which it's directed
 - 'Follow' gaze even to hidden objects
 - Follow 'gaze' of non-human agent
 - Treat words as capable of conveying hidden goals!

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Do infants point referentially?

- 12-month-olds point at objects when interacting with adults
- Why?
 - They want nothing from the adult?
 - They want adult attention to themselves?
 - They want to direct the adult's attention to the object?
 - They want to share joint attention to the object?

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Do infants point referentially? (Liszkowski et al.)



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Do infants point referentially? (Liszkowski et al.)

- Adults respond to 12-month-olds' points in one of 4 ways:
 - Joint attention (child & puppet)
 - attend to Child only
 - attend to Puppet only
 - Ignore
- Measure infants' response across trials

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Predictions? Which outcome do you think will satisfy a 12-month-old infant?

If they point referentially?

- A: Joint attention (child & puppet)
- B: attend to Child only
- C: attend to Puppet only
- D: Ignore

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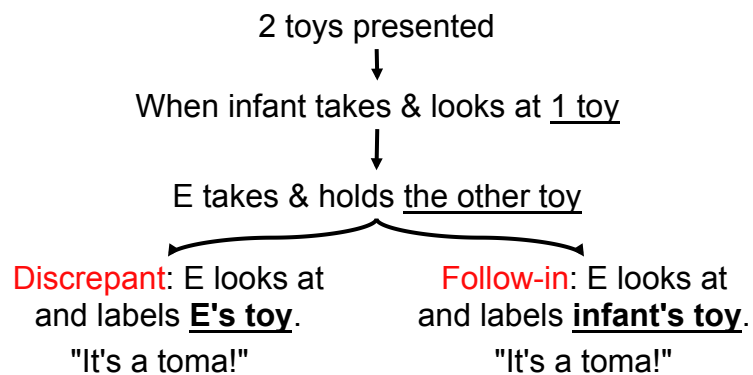
Do infants point referentially? (Liszkowski et al.)

- Pointed more across trials in joint-attention condition than others
- But kept pointing within each trial less in joint-attention condition than others

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Do infants use eye gaze & pointing to determine word reference?

- Baldwin (1993)
- 13, 16, and 19-month-olds
- **Discrepant** versus **Follow-in** labeling:



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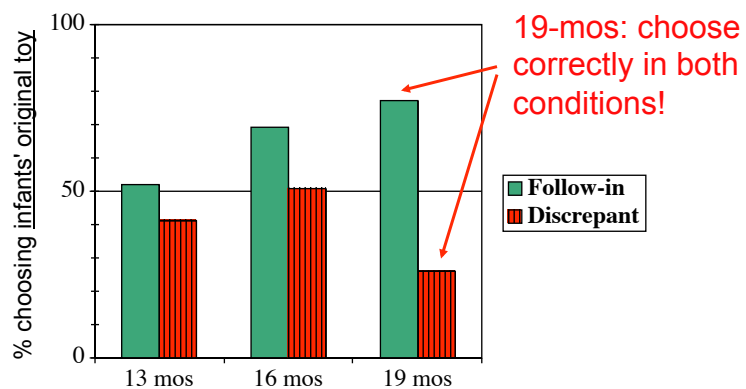
First, where did the infants look when the experimenter produced the label?

At all 3 ages:

- Infants looked longer at E and E's toy during discrepant than follow-in labeling
- Infants followed E's gaze:
 - In Discrepant condition, looked to E & then E's toy
 - In Follow-in, looked to E then back to I's toy

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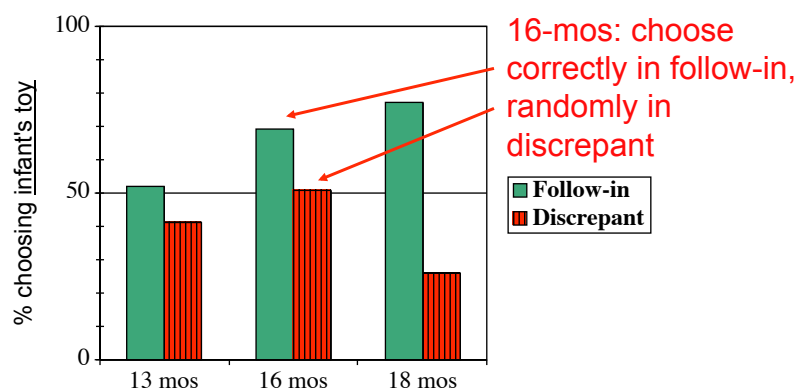
Word comprehension results: Find the toma!



note: choosing the infant's own toy is correct for Follow-in but wrong for Discrepant labeling.

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Word comprehension results: Find the toma!



What do these findings suggest?

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Could there be a non-mentalistic interpretation of Baldwin's results? What might it be?

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Nurmsoo & Bloom (2008)

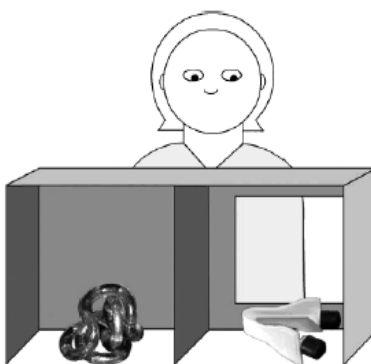
How do children use eye gaze in word-learning?

- Do they 'blindly' treat speaker's eye-gaze as a cue to what she is referring to?
- Or do they integrate info about where the speaker looks with info about what the speaker says?

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Integrating gaze & words?

Consider this scenario:



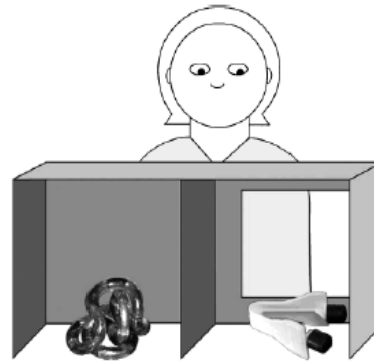
What is she referring to if she says "There's the spoodle!"
 What if she says "Where's the spoodle?"

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Nurmsoo & Bloom (2008): Expt 1

4- and 2.5-year-olds

- Speaker absent
 - 2 objects are placed on child's side of windowed screen
- Speaker returns
 - Looks at object in window and says:
"There's the spoodle!"
OR
"Where's the spoodle?"



What should the child pick in these 2 conditions (There! and Where?)?

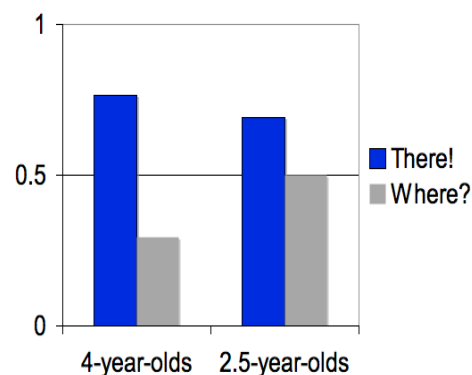
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Expt 1 Results: *How often did children choose the mutually visible object?*

Children treated "There" and "Where" differently

- More often chose visible object for "There's ...!" than for "Where's ...?"
 - 4's chose correctly in both conditions
 - 2.5's at chance in "Where?" condition

Children integrated eye-gaze & words!



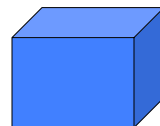
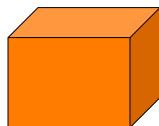
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Southgate et al. (2010)

- Can toddlers learn a word based on a speaker's *false belief*?
- 17-month-old infants
- Warm-up trials: designed to get infants used to searching in two boxes
- A single test trial:
 - Set up to establish False belief OR True belief about what object is in a container

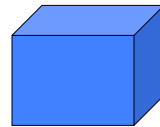
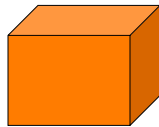
Southgate et al. (2010)

- Warm-up trials: to get infants used to searching in 2 boxes
 - 2 boxes
 - 2 familiar objects (e.g., duck & shoe)
 - E hides each object in a box
 - urges child to "Find the duck" or "Find the shoe!"



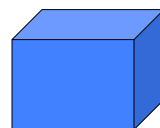
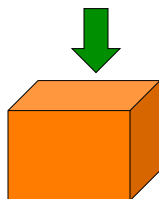
Southgate et al. (2010)

- Critical Test trial: False belief condition
 - 2 novel objects
 - E1 -- puts one in each box, closes the lids
 - says she has to leave for a few minutes
 - E2 (*sneaks* out from behind curtains!), removes objects from boxes, *switches them*, and leaves



Southgate et al. (2010)

- Test trial: False belief condition
 - E1 returns, points to one box
 - "*Remember what I put in this box? There's a sefo in here! Can you get the sefo?*" (repeats until child searches in one of the boxes)



Southgate et al. (2010)

- Test trial: **TRUE belief condition**
 - novel objects
 - E1 -- puts one in each box, closes the lids
 - says she has to leave for a few minutes
 - E2 (sneaks out from behind curtains!), removes objects from boxes, *switches them*, and leaves



*The same as False except
E1 returns here, sees the switch*

Southgate et al. (2010)

When E1 points to a box and says "There's a sefo in here!
Can you get the sefo?" ...

- Where should the child search in the TRUE BELIEF condition?
- In the FALSE BELIEF condition?



Southgate et al. (2010)

- True belief condition: chose box E1 pointed to
- False belief condition: chose the OTHER box
- Suggests they used the speaker's false belief to interpret what she meant
 - *Speaker's meaning depends on her knowledge*



Outline

1. Infant participation in social interaction
2. Infant understanding of actors' goals
3. Infant comprehension of the referential nature of gaze and pointing ... and words
4. Infant use of social knowledge in communication
 - 16- & 19-month-olds use eye gaze to interpret words
 - By 2.5 years, children don't just follow eye gaze -- they interpret it relative to speaker's words & knowledge
 - 17-month-olds use speaker's false belief to identify what object she's talking about